MALAKHOV, D.A.

TITLE: Conference on Autoclave Processes

PERIODICAL: Tsvetnyye metally, 1959, Nr 7, pp 84-87 (USSR)

ABSTRACT: On 23-26 February 1959 a conference was held in Moscow for summing-up and coordinating work on autoclave processes in the metallurgy of heavy, non-ferrous, rare and noble metals. The conference heard reports as follows: D.M. Yukhtanov, Gintsvetmet, on progress throughout the world on the use of hydrometallurgical, particularly autoclave, methods for non-ferrous and rare metal production; G. N. Dobrokhotov, Gipronikel', on nickel leaching practice at some Soviet works; N. I. Onuchkina and G. N. Dobrokhotov on the thermodynamics and kinetics of the selective reduction by hydrogen and carbon monoxide under pressure of nickel and cobalt from solution; I. Yu. Leshch and K. M. Shelepova, Gipronikel', on design decisions on the application of the flowsheets dealt with by G. N. Dobrokhotov at the Yuzhuralnikel' and Severonikel' Combines and the Ufaleyskiy (Ufa) Nickel Works; I. N. Maslenitskiy, Leningradskiy gornyy institut (Leningrad Mining Institute) on the advantages of a combined flotation-autoclave method for nickel-electrolysis of slimes containing platinum-group metals; V. B. Zhilkin, Severonikel' combine, and S. I. Sobol', Gintsvetmet, on the essentials of the neutral method of oxidizing leaching of nickel concentrate from converter-matte flotation; S. I. Sobol' on preliminary investigations on the development of a sulphurous-sulphuric method for leaching nickel and cobalt from oxidized nickel ores; N. N. Maslenitskiy, Mekhanobr, on the main results of investigations of the autoclave-soda process for treating tungsten-ore beneficiation products; V. I. Poprukaylo, Mekhanobr, and D. A. Malakhov, Skopinskaya (Skopinsk) TsOF, separately, on problems in the application of an autoclave-soda flowsheet to scheelite and wolframite raw material; G. A. Meyerson, K. Ya. Shapiro, N. N. Khayskiy, R. A. Pavlyuk and A. P. Nadol'skiy, Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Non-Ferrous Metals Institute) on the treatment of tungsten concentrates in hermetical, heated ball-mills with acids or caustic alkalies; V. I. Spiridonova, S. I. Sobol', Ye. I. Gulyayeva, Z. L. Berlin, I. M. Nelen' and B. I. Rudenko, Gintsvetmet, on the treatment of prepared and unprepared sulphide molybdenum raw material by oxidizing autoclave alkaline leaching; I. M. Nelen' and S. I. Sobol' on the kinetics of oxidizing autoclave leaching; A. N. Zelikman and Z. M. Lyapina, Krasnoyarsk Non-Ferrous Metals Institute, on the results of a study of conditions for the selective separation of lower oxides of tungsten and molybdenum from their salt solutions by hydrogen under pressure; M. V. Darbinyan, Gorno-metallurgicheskiy institut (Mining-Metallurgical Institute) of the Sovnarkhoz (economic council) of the Armyanskaya SSR (Armenian SSR), on his investigations of ammoniacal autoclave leaching under oxygen pressure of molybdenum concentrates; S. I. Sobol' on technical-economic factors of ammoniacal leaching; A. I. Sinel'nikova and I. N. Plaksin, Krasnoyarsk Non-Ferrous Metals Institute, on an oxidizing autoclave process for gold-containing raw material; N. G. Tyurin, Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute) on the behaviour of noble metals in oxidizing autoclave leaching in thiosulphate solutions; A. L. Tseft and D. A. Taraskin and A. Yu. Dadabayev, Institut metallurgii i obogashcheniya AN Kaz SSR (Metallurgy and Beneficiation Institute of the AS Kaz SSR), respectively, on the physicochemical fundamentals and on works' trials of autoclave salt leaching of polymetallic materials; I. Yu. Leshch, Gipronikel', on the unsuitability of autoclave leaching for lime-containing materials; V. A. Bernshteyn, VAMI, on industrial experience of a continuous autoclave leaching process for bauxites; V. G. Tronev, IONKh AN SSSR (IONKh AS USSR), on compounds of some rare elements in various valency states under oxygen and hydrogen pressure in the presence of anhydrous ammonia; Z. L. Berlin, Gintsvetmet, on autoclave design and operation; P. G. Yakovlev, Gipronikel', and N. Ye. Vishnevskiy, VNII neftekhim, on model studies on autoclaves and the development of mixers; M. A. Polyanov, E. B. Giredmet, on the design of an experimental high-pressure pulp pump. G. L. Shvarts, NIIKhIMMASh, on the selection of steel for acid leaching of cobalt matte and matte-flotation concentrate; Yu. I. Archakov, VNIIneftekhim, on corrosion of types 1Kh18N9T, 12Kh5M, 10Kh5MD and 10GND steels in soda and alkaline solutions in the presence of metal salts and oxygen at 5 - 15 kg/mm²; V. I. Deryabina and N. N. Kalgutin, VNIIneftekhim, separately, on mechanical properties of hydrogen-affected steels. The conference made recommendations aimed at the extension and improve

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Card 2/5

Card 3/5

Card 4/5

MALAKHOV, D. A. Cand Tech Sci -- (diss) "Chemicometallurgical studies ~~research~~ on the Treatment ~~reprocessing~~ of collective wolframite products and tungsten-containing metal wastes." Mos, 1959. 16 pp (Min of Geology and Minerals Conservation USSR. All-Union Sci Res Inst of Mineral Raw Material VIMS), 200 copies (KL, 45-59,146)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

MALAKHOV, B.M.

Test operations on a surface ship with a pendular instrument. Trudy TSNIIGAIK no.159:29-61 '64. (MIRA 17:12)

[illegible]

ACCESSION NR: AP5019057

acceleration and its first derivative. The gauges are placed on the apparatus and on its unstabilized support.

ASSOCIATION: none

SUBMITTED: 11May64 | ENCL: 00 | SUB CODE: ES, IE

NO REF SOV: 000 | OTHER: 000

[illegible]

L 30113-65 EWT(1)/EWA(v) Po-4/Pe-5/Pq-4/... GW

ACCESSION NR: AP5019099 UR/0286/65/000/012/0083/0083

AUTHORS: Khrizolit, M. Ye.; Malishov, B. M.; Slavin, Yu. A.; Siryakovskiy, B. P.; Malinov, N. [illegible]

TITLE: A method for measuring the force of gravity at sea. Class 42, No. 172068

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 12, 1965, 83

TOPIC TAGS: gravitation, gravitation field, gravity acceleration, gravimeter

ABSTRACT: This Author Certificate presents a method for measuring the force of gravity at sea with a gravimetric apparatus stabilized in the plane of the absolute horizon. The apparatus moves in respect to the ship under the influence of the disturbing horizontal accelerations. To simplify the compensating devices, to improve the accuracy of measurements taken with the apparatus, and to make the operations possible in rough seas, the gravimetric apparatus (the sensitivity of which to the fluctuating horizontal gravity accelerations changes in various directions from zero to some maximum value) is so oriented that the direction of its maximum sensitivity to the horizontal acceleration becomes parallel to the greatest component of the ship's horizontal accelerations. The apparatus is then moved only in this direction under the action of the gauges indicating the horizontal

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ACCESSION NR: AR4036343

for estimating the influence of vibrations and accelerations with the objective of developing experimental work for use of the pendulum instrument in an aero-gravimetric survey. An IL-12 aircraft was used for making 5 flights of altitudes of 900, 1,200 and 1,500 m during which the altitude variations were ± 10-30 m. Horizontal accelerations attained 15 gals and vertical accelerations up to 50 gals. Flight duration along a linear flight line was 15-25 minutes. The instrument operated normally on all flights. With respect to the influence of accelerations the conditions for flight observations unexpectedly were better than in measurements made aboard surface vessels. Plans call for manufacture of a special model of a pendulum instrument and continuation of experimental aircraft measurements. P. Shokin.

DATE ACQ: 17Apr64 SUB CODE: AS ENCL: 00

Card 2/2

BR

ACCESSION NR: AR4036343 S/0169/64/000/003/G025/G025

SOURCE: Referativny*y zhurnal. Geofizika, Abs. 3G164

AUTHOR: Malakhov, B. M.; Kheyfets, M. Ye.

TITLE: The possibility of making pendulum measurements of gravity aboard an aircraft

CITED SOURCE: Sb. ref. Tsentr. n.-i. in-t redo., aeros"emki i kartogr., vy*p. 32, 1962, 30-33

TOPIC TAGS: gravity, gravity measurement, geophysics, gravimetry, gravimetric survey

TRANSLATION: The gravimetric laboratory of the Tsentral'ny*y nauchnoissledovatel'skiy institut geodezii, aerofotos"yemki i kartografii (Central Scientific Research Institute of Geodesy, Aerial Photography and Cartography) in November 1961 made an attempt to use the ship-borne pendulum instrument (Sb. ref. Tsentr. n.-i. in-t geod., aerofotos"yemki i kartogr., 1962, no. 32, 24-29) aboard an aircraft for determining the stability of operation of the pendulums and also

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ACCESSION NR: AR4036342

discrepancies (-1.3 ± 2.2 mgal). Introduction of a correction for horizontal accelerations leads to large systematic errors. P. Shokin.

DATE ACQ: 17Apr64 SUB CODE: AS ENCL: 00

Card 3/3

ACCESSION NR: AR4036342

In 1960 a model of the shipboard pendulum instrument was constructed; it includes a four-pendulum support, a gyroframe and a horizon photorecorder (see Sb. ref. Tsentr. n.-i. in-t geod., aeros"yemki i kartogr., 1962, no. 32, 21-23). A film 19 cm wide is used for recording four real and two fictitious pendulums and also the vertical accelerometer. The records of the horizon photorecorder are used for control of instrument stabilization and determination of the accuracy of operation of the gyrostabilized platform. Synchronization of all the records is accomplished using a quartz clock. Tests of the model of the shipboard pendulum instrument were made aboard a vessel with a displacement of 6,000 tons. Ninety stations were determined, of which 26, insofar as possible, coincided with stations where pendulum observations were made aboard a submarine. For 26 control stations the Brown corrections for horizontal accelerations averaged -81 mgal and for vertical accelerations +125 and ±134 mgal respectively. Corrections for vertical accelerations at all control points improve the results of surface measurements and the differences in anomalies agree with submarine measurements with a mean square error of ±11 mgal with an absence of systematic

Card 2/3

ACCESSION NR: AR4036342 S/0169/64/000/003/G025/G025

SOURCE: Referativny*y zhurnal. Geofizika, Abs. 3G163

AUTHOR: Kheyfets, M. Ye.; Malakhov, B. M.; Berezin, E. M.

TITLE: Experience in gravity measurement on shipboard

CITED SOURCE: Sb. ref. Tsentr. n.-i. in-t reqd., aeros"emki i kartogr., vy*p. 32, 1962, 24-29

TOPIC TAGS: gravimetry, gravimeter, pendulum measurement, gravimetric survey, geophysical instrument

TRANSLATION: An experimental apparatus has been designed for gravimetric observations with a pendulum instrument on shipboard. The apparatus is equipped with a device for centering, arresting and locking the pendulums while being transported in their supports. The apparatus was adapted to a N-55 gyrostabilized platform and experimental measurements were made on shipboard. The pendulums make it possible to make measurements when there are waves at sea up to class 4-5. Pendulum periods are determined with sufficient accuracy from the photogram.

Card 1/3

MALAKHOV, B.B.

Significance of the combined use of drug and occupational therapy in the readaptation of patients with schizophrenia of long druation. Vop. psikh. nevr. no.10:300-311 '64.

(MIRA 18:12)

1. Lechebno-proizvodstvennyy kombinat 1-go psikhiatricheskogo otdeleniya (nauchnyy rukovoditel' - prof. T.Ya.Khvilivitskiy) Leningradskogo nauchno-issledovatel'skogo psikhonevrologicheskogo instituta imeni V.M.Bekhtereva (direktor - B.A.Lebedev).

DESYATNIK, E.M., inzh., red.; YELISEYEVA, Ye.Ye., inzh., red.; MURASHOV, A.G., inzh., red.; GUSEV, V.I., inzh., red.; MALAKHOV, A.Ye., inzh., red.; PETROV, G.F., inzh., red.; FILIMONOV, S.Ye., inzh., red.; ROKKO, M.A., inzh., red.; ANDREYEV, L.N., inzh., red.; TURIANSKIY, M.A., inzh., red.; ZERENKOV, A.D., inzh., red.

[Collections Nos. 10, 20, 31, and 42 of standard district uniform estimates for construction work] Sborniki No.10, 20, 31 i 42 edinykh raionnykh edinichnykh rastsenok na stroitel'nye raboty. Moskva, Stroiizdat, 1965.

(MIRA 18:10)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam stroitel'stva. 2. Gosstroy SSSR (for Desyatnik, Gusev, Filimonov). 3. Nauchno-issledovatel'skiy institut ekonomiki stroitel'stva Gosstroya SSSR (for Yeliseyeva, Murashov, Rokko, Andreyev, Malakhov, Turianskiy). 4. Gosudarstvennyy soyuznyy institut po proyektirovaniyu spetsial'nykh sooruzheniy, zdaniy, sanitarno-tekhnicheskikh i energeticheskikh ustroystv dlya predpriyatiy khimicheskoy promyshlennosti (for Petrov). 5. TSentral'nyy nauchno-issledovatel'skiy i proyektno-eksperimental'nyy institut promyshlennykh zdaniy i sooruzheniy (for Zerenkov).

MALAKHOV, A.Ye.; BULATOV, D.I.

Separation of Bakal carbonate ores in the Thoulet solution by the method of centrifugation. Trudy Gor.-geol.inst. UFAN SSSR no.56:151-153 '61. (MIRA 15:7)
(Bakal region--Carbonates--Analysis)

MALAKHOV, A.Ye.; BULATOV, D.I.

Textures of carbonate iron ores of the Bakal region. Trudy Gor.-geol. inst. UFAN SSSR no.40:93-112 '59. (MIRA 13:11)

(Bakal region--Iron ores)

DIYEV, N.P. [deceased]; MALAKHOV, A.Ye.; PADUCHEV, V.V.; TOPOROVA, Z.V.

Investigating shaft furnace smelting of Ural Mountain sulfide copper ores. Trudy Inst.met.UFAN SSSR no.3:21-35 '59. (MIRA 13:4)

(Ural Mountains--Copper ores)
(Smelting furnaces)

MALAKHOV, A.Ye.; BULATOV, D.I.

Determining Bakal carbonate minerals by color reactions.
Zap. Vses. min. ob-va 87 no.4:501-503 '58. (MIRA 12:1)
(Bakal region--Carbonates (Mineralogy))

MALAKHOV, A.Ye.

Strontium in dolomites and siderites of the Bakal ore deposit.
Nauch.dokl.vys.shkoly; geol.-nauki no.4:125-127 '58.
(MIRA 12:6)

1. Sverdlovskiy gornyy institut, kafedra geologii rudnykh mestorozhdeniy.
(Bakal region--Strontium)

Malakhov, A. Ye.

IVANOV, A.A., glavnyy red. [deceased]; MALAKHOV, A.Ye., prof., doktor geol.-min.nauk, red.; FADDEYEV, B.V., ~~kand.~~tekhn.nauk, red.; POTAPOVA, T.S., red.; FAVORSKAYA, A.P., red.; IZMODENOVA, L.A., tekhn.red.

[Problems in the development of the Bakal mineral region; a collection of papers of the Bakal onference, June 8-11, 1955] Voprosy razvitiia Bakal'skoi rudnoi bazy; sbornik trudov Bakal'skogo soveshchaniia (8-11 iiunia 1955 g.). Sverdlovsk, 1957. 221 p. (MIRA 11:3)

1. Akademiya nauk SSSR. Ural'skiy filial. Sverdlovsk. 2. Chlen-korrespondent AN SSSR (for Ivanov)
(Bakal region--Mines and mineral resources)

ILLEGIBLE

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

Category: USSR D

Abs Jour: RZh--Kh, No 3, 1957, 7829

Bakal ore as a complex magnesite-siderite orebody. The results of eleven chemical analyses on S are given. See also RZhKhim, 1956, 35682.

Card : 2/2

- MALAKHOV, A. YE.

Category: USSR D

Abs Jour: RZh--Kh, No 3, 1957, 7829

Author : Malakhov, A. Ye.
Inst : Mining and Geologic Institute of the Urals Branch of the Academy of Sciences USSR

Title : On the Origin of the Sideritic Ores of the Bakal Type

Orig Pub: Tr. Gorno-geol. in-ta, Ural'sk. fil, AN SSSR, 1955, Vol 26, 153-165

Abstract: The primary siderite ores of the Bakal region are contemporaneous with the two upper proterozoic levels of the Bakal fold. The ores consist mainly of siderite (S) with the addition of carbonates of Mg, Ca, and Mn. The stratigraphic succession and stratified structure of the ore, the numerous rhythmic alternations of layers of S with layers of dolomites and less frequently magnesites, quartzites and argillites, and the fine-grained structure of S and of the dolomites and other indices point to the sedimentary origin of the ore. The presence of magnesite layers in the S testifies to the genetic similarity between the Bakal ores with the Satkin sedimentary ores and permits one to consider the

Card : 1/2

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MALAKHOV, A.Ye.

ARASHKEVICH, V.M., dotsent, redaktor; VESELOV, A.M., professor, redaktor; VOLOTKOVSKIY, S.A., professor, redaktor; ZHUKOV, L.I., dotsent, redaktor; IPPOLITOV, N.D., dotsent, redaktor; KAMPANEYETS, V.P., dotsent, redaktor; KUTYUKHIN, P.I., dotsent, redaktor; MALAKHOV, A.Ye., professor, redaktor; NEUDACHIN, G.I., dotsent, redaktor; RYABUKHIN, G.Ye., professor, redaktor; SAKOVTSEV, G.P., dotsent, redaktor; STOYLOV, B.A., dotsent, redaktor; TROP, A.Ye., dotsent, redaktor; FEDOROV, S.A., professor, redaktor; YAROSH, A.Ya., dotsent, redaktor; SLAVOROSOV, A.Kh, redaktor izdatel'stva; ALADOVA, Ye.I., tekhnicheskiy redaktor

[Problems in the efficient organization of surveying in mining enterprises] Voprosy ratsionalizatsii marksheidarskoi sluzhby na gornykh predpriiatiiakh. Moskva, Ugletekhizdat, 1955. 128 p. (MLRA 9:10)

1. Sverdlovsk. Gornyy institut.
(Mine surveying)

MALAKHOV, A Ye

ARASHKEVICH, V.M., dotsent; VESELOV, A.I., professor; VOLOTKOVSKIY, S.A., professor; ZHUKOV, L.I., dotsent; IPPOLITOV, M.D., dotsent; KUTYUKHIN, P.I., dotsent; KOMPANEYETS, V.P., dotsent; MALAKHOV, A.Ye., professor; NEUDACHIN, G.I., dotsent; RYABUKHIN, G.Ye., professor; SAKOVTSEV, G.P., dotsent; STOYLOV, B.A., dotsent; TROP, A.Ye., dotsent; FEDOROV, S.A., professor; YAROSH, A.Ye., dotsent, redaktor; TARKHOV, A.G., redaktor; GAMBURTSEVA, Ye.Ye., redaktor; GUROVA, O.A., tekhnicheskiy redaktor.

[Collection of articles on geophysical methods of prospecting] Sbornik statei po geofizicheskim metodam razvedki. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geol. i okhrane nedr, 1955. 109 p. (MLRA 8:11)

1. Sverdlovsk. Gornyy institut.
(Prospecting--Geophysical methods)

OA

9

Investigation of the mineralogical composition of molding sands. A. E. Malakhov. *Liteinoe Delo* 9, No. 8-9, 47-50(1938); *Chem. Zentr.* 1939, I, 4624.—The mineralogical investigation of various samples of molding sand taken from old molds showed such tests to be a very satisfactory method of detg. the quality of a given molding material. Thus it was shown that in the case of large castings the sand from the molding mass reacts with certain metal bases, as FeO and MnO, to form Fe_2SiO_4 and Mn_2SiO_4. These materials were found, however, only to a depth of 1-1.5 cm. In no case were further thermal modifications of the sand (as tridymite) found. M. G. M.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

18

Ca

Petrographic composition of slag obtained from melting bauxite ore in blast furnaces. A. B. Malakhov. *Sovet. Met.* 9, No. 9, 83-84 (1937); *Chem. Zentr.* 1939, II, 1351.— Some cryst. structures of binary and ternary eutectics were found in slag obtained from melting bauxite ore in blast furnaces. The presence of 3 $CaO.Al_2O_3.SiO_2$ was ascertained. M. V. Condoide

COMMON ELEMENTS

COMMON VARIABLES INDEX

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

1ST AND 2ND LETTER

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

1

Mineralogical-petrographic investigation of titanium blast-furnace slags. A. E. Malakhov. *Sovet. Met.* 7, No. 8, 12-19(1935); *Chem. Zentr.* 1936, I, 4354; cf. *C. A.* 31, 6148[8].—Mineralogical investigations are reported on the form of the Ti occurring as oxide in such slags.

M. G. Moore

COMMON ELEMENTS

MATERIALS INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

AUTHOR INDEX

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2ND LETTER

3RD AND 4TH ORDERS

MATERIALS INDEX

Fe GROUPS

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

Mineralogical petrographic investigation of blast furnace slag of titanium-magnetite melts. A. F. Malakhov. *Sovet. Met.* **6**, 471-7 (1934); *Chem. Zentr.* **1935**, II, 3300. Microscopic investigations of the mineral.-petrographic compns. of 3 different blast-furnace melts obtained in the smelting of Ti-magnetites are reported. M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

Ch

8

Mineralogical investigation of agglomerates of the Mt. Blagodat and Mt. Vuisokii iron ores. A. E. Malakhov. *Sovet. Met.* 6, 311-15(1934).—Agglomerates sintered at a low temp. contained predominantly hematite with small amts. of magnetite and fayalite. Those sintered to a high temp. contained principally magnetite, with a small amt. of hematite, up to 31% fayalite, and some grunerite.

H. W. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

VASIL'YEV, G.I. (Moskva); DEM'YANOV, Yu.A. (Moskva); KURNAKOV, V.I. (Moskva); MALAKHOV, A.V. (Moskva); RAKHMATULIN, Kh.A. (Moskva); RUMYNSKIY, A.N. (Moskva)

Experimental determination of the heat conductivity coefficient of thermal insulation materials using the self-modeling method. PMTF no.3:67-70 My-Je '63. (MIRA 16:9)
(Heat conduction) (Insulating materials)

TEMKIN, O.N.; FLID, R.M.; MALAKHOV, A.I.

Soluble complexes of unsaturated hydrocarbons with metal salts and their role in catalytic reactions. Part 3: Soluble π-complexes of mercury (11) with acetylene. Kin.i kat. 4 no.2: 270-276 Mr-Ap '63. (MIRA 16:5)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni Lomonosova.
(Mercury organic compounds) (Acetylene compounds) (Catalysis)

Soluble complexes ... S/195/62/003/006/011/011
E075/E436

makes the hydration of acetylene more difficult. There are 6 figures and 2 tables.

ASSOCIATION: Institut tonkoy khimicheskoy tekhnologii im. M.V.Lomonosova (Institute of Fine Chemical Technology imeni M.V.Lomonosov)

SUBMITTED: October 16, 1961

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

in 0.288 M H_2SO_4. This indicated that a soluble half-acetylide $HC \equiv CAg$ formed in addition to the π-complex. The reactions taking place are as follows:

$$Ag^+_{aq} + C_2H_{2aq} \xrightleftharpoons{K_1} AgC_2H^+_{2aq} \qquad (I)$$

$$Ag^+_{aq} + C_2H_{2aq} \xrightleftharpoons{K_2} AgC_2H_{aq} + H^+_{aq} \qquad (II)$$

The enthalpy values for reactions I and II are -13.20 and +6.86 respectively. Low catalytic activity of silver salts in the hydration process in comparison with that of copper salts is explained by low values of K_1 [K_1 (373°C) = 0.6 litre/mole] compared with the corresponding value for Cu (20 litres/mole). The strong tendency to acetylide interaction prolongs the formation of the halfacetylide. Moreover high acidities (6 to 7 M H_2SO_4) necessary for decreasing the acetylide interaction, cause a strong dehydration of the π-complex, which

S/195/62/003/006/011/011
E075/E436

AUTHORS: Temkin, O.N., Flid, R.M., Malakhov, A.I.

TITLE: Soluble complexes of unsaturated hydrocarbons with metal salts and their role in catalytic reactions
II. Soluble compounds of acetylene with silver salts

PERIODICAL: Kinetika i kataliz, v.3, no.6, 1962, 915-919

TEXT: In connection with the studies of the mechanism of hydration of acetylene in silver salt solutions, it becomes necessary to elucidate the possibility and conditions for the formation of the π-complex. The thermodynamics of the complex formation were investigated by a potentiometric method (Kinetika i kataliz, v.2, 1961, 205). The silver electrode was prepared by depositing Ag on a platinum spiral at the current density of 0.003 A/cm^2 and was immersed in aqueous 1 to 7 M H_2SO_4. As acetylene was passed through the solutions, the electrode potential decreased irreversibly (ΔE_1) and reversibly (ΔE_2). ΔE_1 was related to the formation of Ag_2C_2. ΔE_2 decreased with the increasing concentration of H_2SO_4, but increased and passed through a maximum with increasing temperature (from 20 to 100°C)
Card 1/3

KUZNETSOV, D. A.; MALAKHOV, A. I.; FURMER, I. E.

Investigating the protective action of substances introduced into forming mixtures in magnesium alloy casting. Trudy MKHTI no.35: 171-176 '61. (MIRA 14:10)

(Magnesium alloys)

18(2,3) SOV/128-59-5-18/35

AUTHOR: Kuznetsov, D.A., Candidate of Chemical Sciences, and Malakhov, A.I., Candidate of Technical Sciences

TITLE: Use of Boron Chloride in Casting Magnesium Alloys

PERIODICAL: Liteynoye, Proizvodstvo, 1959, Nr 3, pp 32 (USSR)

ABSTRACT: The authors refer to the methods and patents in the western hemisphere on the use of boron fluoride in casting magesium alloys as listed sub references. The authors state that for refining of magnesium-alloys, especially ML-5 boron chloride, is used. The decomposing of $BC1_3$ by water is described as well as the chemical equations of the possible reactions. There are 5 references, 1 of which is Soviet, 3 English and 1 German.

Card 1/1

Influence of the Protective Fluxes Upon the Porosity of Castings Made of Magnesium Alloys SOV/163-58-4-14/47

substantial change in the porosity of castings. 2) The character of the porosity (density) distribution curves in castings made of the primary alloy ML-5 does not permit to judge the extent of reaction of the castings with their molds. 3) When investigating samples made of secondary metal no considerable changes in the porosity distribution were observed. There are 3 figures and 7 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskiy institut imeni Mendeleyeva (Moscow Institute of Chemical Technology imeni Mendeleyev)

SUBMITTED: April 19, 1958

Card 2/2

18(4)

AUTHORS: Kuznetsov, D. A., Koval', Zh. A., Malakhov, A. I. SOV/163-58-4-14/47

TITLE: Influence of the Protective Fluxes Upon the Porosity of Castings Made of Magnesium Alloys (Vliyaniye zashchitnykh prisadok na poristost' otlivok iz magniyevykh splavov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4, pp 82-86 (USSR)

ABSTRACT: A fluor flux is used in the works of the USSR in the production of parts made of magnesium alloys when casting them in sand-molds. A great drawback of these fluxes is the high toxicity of the gases and vapors separated when, in the workrooms, the metals are cast into the molds. Here various protective fluxes developed in the USSR are recorded. A comparison is made between the porosity of ingots when adding the various protective fluxes to the material of the mold under otherwise similar testing conditions. The tests were carried out according to the method of density measurement. The results were as follows: 1) Substituting the fluor flux or a flux based on sulfur by fluxes based on gravel or urea does not cause any

Card 1/2

KUZNETSOV, D.A.; MALAKHOV, A.I.

Testing of organic compounds as protective additives in casting magnesium alloys. Trudy MKHTI no.24:459-461 '57. (MIRA 11:6)
(Magnesium alloys) (Magnesium founding) (Foundry chemistry)

MALAKHOV, A. I., Aspirant—

"An Investigation of New Admixtures for Molding Sands and an Explanation of Their Screening Effect in the Casting of Magnesium Alloys." Cand Tech Sci, Moscow Order of Lenin Chemicotechnological Inst imeni D. I. Mendeleyev, 3 Nov 54. (VM, 21 Oct 24)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (10)

SO: Sum. No. 481, 5 May 55

KOZLOVSKIY, Boris Alekseyevich; MALAKHOV, Aleksandr Yakovlevich; PANASHCHATENKO, Konstantin Andreyevich; PERN, Lev Konstantinovich; SEPEROVICH, I.P., red.; GOROKHOV, M.G., red.izd-va; TIKHONOVA, N.V., red.izd-va; BACHURINA, A.M., tekhn.red.

[Manual for forest managers] Spravochnik lesoustroitelia. Moskva, Goslesbumizdat, 1959. 275 p. (MIRA 13:10)
(Forest management)

L 18053-63
ACCESSION NR: AP3002807

0

where λ is the coefficient of heat conductivity to be determined and c_p and γ are the thermal capacity and specific weight which are considered known functions of T. Thus it is sufficient to determine the character of the temperature change at one point of the specimen in order to know the entire temperature field $T = T(\xi)$. Integrating (1.1) from ξ to ∞ and letting $\partial T/\partial \xi \to 0$ as $\xi \to \infty$,

$$\lambda(\xi) = \frac{1}{2(dT/d\xi)} \int_{\xi}^{\infty} c_p \gamma \frac{dT}{d\xi} \xi d\xi \qquad (1.2)$$

Orig. art. has: 4 formulas and 6 figures.

ASSOCIATION: none

SUBMITTED: 12Jun62 DATE ACQ: 16Jul63 ENCL: 00

SUB CODE: PH NO REF SOV: 007 OTHER: 001

Card 2/2

L 18053-63 EPR/EWP(r)/EWP(j)/EPF(c)/EWT(1)/EPF(n)-2/EWT(m)/BDS/ES(v)/ES(w)-2 AFFTC/ASD/SSD Pab-4/Pe-4/Ps-4/Pc-4/Pr-4/Pu-4 RM/WW/MAY

ACCESSION NR: AP3002807 S/0207/63/000/003/0067/0070

AUTHORS: Vasil'yev, G. I.; Dem'yanov, Yu. A.; Kurnakov, V. I.; Malakhov, A. V.; Rakhmatulin, Kh. A.; Rumyantskiy, A. N. (Moscow)

95

TITLE: Experimental determination of the coefficient of heat conductivity of heat-insulated materials by the method of automodel behavior

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1963, 67-70

TOPIC TAGS: heat conduction, coefficient of heat, automodel

ABSTRACT: The authors propose an experimental method for determining the coefficient of heat conductivity of a material which makes use of the fact that, with the transformation $\xi = x/\sqrt{t}$, x being position and t being time, if the material is essentially one-dimensional as in an infinite rod (i.e., the transverse dimensions and height of the initially heated specimen must be much greater than the thickness at the time of the experiment) then T as a function of ξ satisfies

$$c\rho\gamma \frac{dT}{d\xi} = -\frac{2}{\xi}\frac{d}{d\xi}\left(\lambda \frac{dT}{d\xi}\right) \qquad (1.1)$$

Card 1/2

L 34411-66

ACC NR: AT6009451 0

increase. The compactness of the spectrum indicates a stochastic noisy character of the biopotentials. The dimensions of the spectrum at high frequencies indicate that the energy of biological activity occurs at subsonic frequencies. It is shown that electromagnetic radiation of bioobjects does exist. The final results show that electromagnetic emission by biological objects cannot serve the function of information carrier in biological communication. This conclusion is based on the fact that the electromagnetic emission is too weak up to 150 kc. Orig. art. has: 4 figures.

SUB CODE: 06, 09, 05 / SUBM DATE: 26Oct65 / ORIG REF: 002 / OTH REF: 001

Card 2/2 BLG

L 34411-66 EWT(1) SCTB DD/GD

ACC NR: AT6009451 SOURCE CODE: UR/0000/65/000/000/0297/0301

AUTHOR: Malakhov, A. N.; Maksimov, A. S.; Nefedov, Yu. Ya.

ORG: None

TITLE: Electromagnetic hypothesis on biological communication

SOURCE: AN SSSR. Nauchnyy sovet po kompleksnoy probleme Kibernetika. Bionika (Bionics). Moscow, Izd-vo Nauka, 1965, 297-301

TOPIC TAGS: communication, electromagnetic radiation, spectrum, very low frequency, bionics, animal physiology

ABSTRACT: The authors measured the spectrum of the biopotentials of certain biological objects. The spectrum included the frequency band from 1 to 500 cps. The electromagnetic radiation from biological objects was also measured at frequencies of 3 to 150 kc. These measurements were conducted in order to verify the other results (e.g., W. K. Volkers, W. Candib. 1960. Detection and analysis of high frequency signals from muscular tissues with ultra-low noise amplifiers. —IRE International Convention Record, part 9.). The apparatus and conditions for these measurements are discussed. The results show that the biological activity spectrum of animals is compact and falls with frequency

ACC NR: AP6022087 SOURCE CODE: UR/0141/66/009/003/0622/0624

AUTHOR: Malakhov, A. N.

ORG: Gor'kiy State University (Gor'kovskiy gosudarstvennyy universitet)

TITLE: Fluctuation in quartz oscillators

SOURCE: IVUZ. Radiofizika, v. 9, no. 3, 1966, 622-624

TOPIC TAGS: electronic oscillator, oscillator theory, quartz crystal, crystal oscillator

ABSTRACT: The results are reported of a theoretical analysis of fluctuation in a two-circuit quartz-crystal oscillator in which the crystal is placed between the tube grid and cathode. Formulas for spectral density of amplitude and phase fluctuations are presented. It is found that the amplitude-fluctuation spectrum has a complicated shape. The frequency-fluctuation spectral-density curve has one or more maxima. An experimental curve (lent by A. I. Chikin) shows a maximum lying near 700 cps. Orig. art. has: 3 figures and 14 formulas.

SUB CODE: 09 / SUBM DATE: 24Jan66 / ORIG REF: 004

Card 1/1 UDC: 538.59:519.25

ZDORNOVA, Ye.A.; MALAKHOV, A.N.

Experimental studies on fluctuations in the coefficient of transistor amplification. Izv. vys. ucheb. zav.; radiofiz. 8 no.4:828-831 '65. (MIRA 18:9)

1. Gor'kovskiy gosudarstvennyy universitet.

L 22704-66

ACC NR: AT6009452 0

experimental groups is 4.5 to 5.62 days compared to 7.6 days for the nonirradiated control group. With increase of irradiation period at the same frequency, the survival rate decreases. In another series, conditioned reflex activity in a UHF field was studied in 5 adult male white mice of the same line and age. Mice were conditioned in a plastic chamber (20 x 10 x 7 cm) divided in half by a partition with an opening and push buttons; the electric signal systems were under the floor. Intensity of irradiation was of the order of 20 mwt/cm. Experiments were staged daily using different sequences of UHF stimuli. The development of conditioned reflexes in response to UHF electromagnetic stimuli was difficult and slow and the effects were temporary. Orig. art. has: 2 tables. [06]

SUB CODE: 06/ SUBM DATE: 26Oct65/ ORIG REF: 003/ ATD PRESS: 4229

Card 2/2 BK

L 22704-66 EWT(1) SCTB DD/GS/JXT(RML)

ACC NR: AT6009452 SOURCE CODE: UR/0000/65/000/000/0302/0305

AUTHOR: Malakhov, A. N.; Romanov, I. V.; Smirnov, Yu. V.; Ul'yanov, M. Yu.

ORG: none

53
B+1

TITLE: Biological indication of a UHF electromagnetic field

SOURCE: AN SSSR. Nauchnyy sovet po kompleksnoy probleme Kibernetika. Bionika (Bionics). Moscow, Izd-vo Nauka, 1965, 302-305

TOPIC TAGS: medical experiment, bionics, UHF, electromagnetic field

ABSTRACT: The effects of an SHF electromagnetic field on viability and conditioned reflex activity were investigated in a series of experiments on plerocercoids and white mice. In the first experimental series, 5 groups of plerocercoids were irradiated with UHF and SHF waves (7.6 m to 13.7 cm) for periods of 10 to 60 min to determine survival rates. Following irradiation each group of plerocercoids was placed in a physiological solution and kept at an 18° temperature. Death was determined by absence of reaction to needle pricks and to heating, and also by body tone condition. Findings show that the survival rate for

Card 1/2

MALAKHOV, A.N.

Solution of nonlinear equations describing amplitude and phase fluctuations of a master oscillator. Izv.vys.ucheb.zav.; radiofiz. 7 no.4: 710-721 '64. (MIRA 18:2)

1. Gor'kovskiy gosudarstvennyy universitet.

MALAKHOV, A.N.; SEREBRYANNIKOV, V.S.

Measuring the technical width of a spectral line in a klystron oscillator. Izv. vys. ucheb. zav.; radiofiz. 6 no.5:1062-1065 '63. (MIRA 16:12)

1. Gor'kovskiy gosudarstvennyy universitet.

ACCESSION NR: AP4007196

could be measured at fixed frequencies from 100 cps to 20 kcs. The tested klystron operated at 9.1 Gc, and the experiments were in the 7th and 8th oscillation zones. The relative widths in these zones were found to be 8.8 x 10^{-8} and 1.4 x 10^{-7}, respectively, and are of the same order of magnitude as at low frequencies. "In conclusion the authors are grateful to L. M. Voly*nkina who took on a major part in the performance of the measurements." Orig. art. has: 3 figures and 3 formulas.

ASSOCIATION: Gor'kovskiy gosudarstevenny*y universitet (Gor'kiy State University)

SUBMITTED: 10Feb63 DATE ACQ: 20Jan64 ENCL: 00

SUB CODE: GE NO REF SOV: 003 OTHER: 000

Card 2/2

ACCESSION NR: AP4007196 S/0141/63/006/005/1062/1065

AUTHORS: Malakhov, A. N.; Serebryannikov, V. S.

TITLE: Measurement of the technical width of a spectral line of klystron oscillator

SOURCE: IVUZ. Radiofizika, v. 6, no. 5, 1963, 1062-1065

TOPIC TAGS: klystron oscillator, klystron frequency fluctuation, klystron spectral density, spectral line width, klystron oscillation analysis, frequency spectrum density, klystron frequency spectrum

ABSTRACT: The results of tests of the frequency fluctuations of a klystron generator are reported. The spectral density of the frequency fluctuations was measured by the method of I. L. Bernshteyn (Izv. AN SSSR,ser. fiz.,v. 14, 145, 1950) and the experimental setup was similar to that described by V. S. Troitskiy and V. V. Khrulev (Radiotekhnika i elektronika,v. 1, 832, 1956). The spectral density

Card 1/2

ZDORNOVA, Ye.A.; MALAKHOV, A.N.

Measuring the amplitude fluctuations of an oscillator operating on semiconductor triodes. Izv. vys. ucheb. zav.; radiofiz. 6 no.4: 854-856 '63. (MIRA 16:12)

1. Gor'kovskiy gosudarstvennyy universitet.

L 17295-63
ACCESSION NR: AP3004836

0

depends but little on the line shape of the synchronizing oscillator. "I sincerely thank R. V. Khokhlov for his useful, critical remarks." Orig. art. has: 90 formulas.

ASSOCIATION: Gor'kovskiy gosudarstvenny*y universitet (Gor'kiy State University)

SUBMITTED: 27Sep62 DATE ACQ: 27Aug63 ENCL: 00

SUB CODE: GE, PH NO REF SOV: 004 OTHER: 000

Card 2/2

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

L 17295-63 BDS

ACCESSION NR: AP3004836 S/0141/63/006/003/0501/0512

45

AUTHOR: Malakhov, A. N.

TITLE: Synchronizing an oscillator by a chance quasi-monochromatic signal

SOURCE: IVUZ. Radiofizika, v. 6, no. 3, 1963, 501-512

TOPIC TAGS: oscillator, quasi-monochromatic signal, electron tube oscillator, synchronizing oscillator

ABSTRACT: A mathematical study is offered of the effect of phase fluctuations in a synchronizing signal upon the phase fluctuations in the synchronized oscillator. The synchronizing of a Thomson-type oscillator by a signal coming from another self-excited oscillator is considered. An equation connecting the amplitude of synchronized oscillations with the external-signal amplitude and the detuning is set up and solved. A specific case of an isochronous oscillator is analyzed. It is found that, in general, the spectral-line shape of the synchronized oscillator

Card 1/2

L 17296-63
ACCESSION NR: AP3004835 S/0141/63/006/003/0495/0500

45

AUTHOR: Malakhov, A. N.

TITLE: Amplitude and phase fluctuations in a self-excited oscillator

SOURCE: IVUZ. Radiofizika, v. 6, no. 3, 1963, 495-500

TOPIC TAGS: self-excited oscillator, oscillator, amplitude fluctuation, phase fluctuation

ABSTRACT: Previous publications have considered the fluctuation of amplitude and phase of self-excited oscillators, under noise conditions, only for the case of a rather wide spectrum. Since this spectrum may be very narrow in a number of practical cases, the author tries to solve the problem for any width and shape of the spectrum. Nonlinear equations are set up for the above-type fluctuations in a self-excited oscillator subjected to an arbitrary noise. Orig. art. has: 23 formulas.

ASSOCIATION: Gor'kovskiy gosudarstvenny*y universitet (Gor'kiy State University)

SUBMITTED: 04 Oct 62 DATE ACQ: 27 Aug 63 ENCL: 00

SUB CODE: GE, PH NO REF SOV: 007 OTHER: 000

Card 1/1

S/141/63/006/001/004/018
E140/E435

Statistical stability of motion

then for all $t > t_0$

$$|m_{\xi}(t)| < \varepsilon \qquad (1.13)$$

$$d_{\xi}(t) < \varepsilon^2 \qquad (1.14)$$

simultaneously. In the contrary case the motion is statistically unstable. Statistical instability means that small fluctuations of the parameters do not lead to small differences of the motion from the unperturbed motion. These concepts are applied to the study of a first order linear differential equation with a fluctuating coefficient. There are 6 figures.

ASSOCIATION: Gor'kovskiy gosudarstvennyy universitet (Gor'kiy State University)

SUBMITTED: May 15, 1962

Card 2/2

S/141/63/006/001/004/018
E140/E435

AUTHOR: Malakhov, A.N.

TITLE: Statistical stability of motion

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Radiofizika, v.6, no.1, 1963, 42-53

TEXT: The author defines motion to be "statistically bounded" if in a dynamic system subject to statistically varying parameters there exists a $t_0 > 0$ such that for all $t > t_0$ there is a positive finite quantity A such that

$$|m_\xi(t)| < A \qquad (1.10)$$

$$d_\xi(t) < A^2 \qquad (1.11)$$

simultaneously, m constituting the mean value and d the mean-square fluctuation of the motion. The motion is termed "statistically stable" if for all $\varepsilon > 0$ there exists $t_0 > 0$ and $\delta > 0$ such that if

$$0 < \min\left\{\langle\alpha_1^2\rangle, \langle\alpha_2^2\rangle, \ldots, \langle\alpha_N^2\rangle\right\} \leqslant \max\left\{\langle\alpha_1^2\rangle, \langle\alpha_2^2\rangle, \ldots, \langle\alpha_N^2\rangle\right\} < \delta \qquad (1.12)$$

Card 1/2

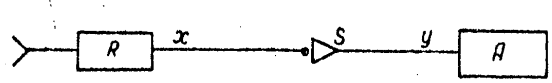
S/141/62/005/003/011/011
E192/E382

Sensitivity of a ....

ASSOCIATION: Gor'kovskiy gosudarstvennyy universitet (Gor'kiy State University)

SUBMITTED: March 12, 1962

Fig. 1:



X

Card 3/3

If it is assumed that the noise pulses are infrequent, the sensitivity of this system is given by:

$$I_1^o = \frac{1}{a}\sqrt{\frac{p_x}{T\tau^o}} = \frac{1}{a}\sqrt{\frac{\bar{n}_{ш}}{T}} \qquad (8)$$

where T is the time constant of the element A,

$\bar{n}_{ш}$ is the average statistical value of the noise pulses. If the receiving system contains k inputs of the type R whose output signals are combined in the coincidence circuit S (Fig. 1), the sensitivity is greatly increased, even for small values of k, without the necessity of increasing the passband of the elements R or the time constant of the detector A. Such a system with many inputs can simulate, to some extent, the detection of weak signals taking place in living organisms. There are 2 figures.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

40027

S/141/62/005/003/011/011
E192/E382

9,7150

AUTHOR: Malakhov, A.N.

TITLE: Sensitivity of a detection method

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 5, no. 3, 1962, 607 - 609

TEXT: The receiving system consists of an element R which transforms the input signal into a train of identical pulses having a duration τ^o, an element S and an element A whose output is proportional to the average number n of pulses per unit time (see Fig. 1). The number of pulses at the output of R per unit time is given by:

$$n_c = aI \quad (1)$$

where I is the amplitude of the input signal. Apart from the pulses due to the input signal, R also produces pulses due to noise, so that the total number of output pulses is:

$$n = n_c + n_{\text{ш}} .$$

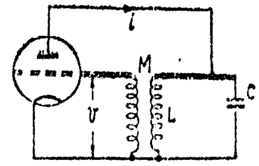
Card 1/3

of p reduces the mean energy and thus the amplitude of the oscillations. Also, if p approaches the critical value p = 1, the energy of the oscillations is greatly reduced. The bifurcation point for p = 1 can thus fall inside the interval of the possible fluctuations of p. Eq. (25) is also used to determine the mean fluctuation-amplitude for the case of arbitrarily slow fluctuations of the feedback coefficient p and the case of δ-correlated (fast) fluctuations.
There are 2 figures.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of Gor'kiy University)

SUBMITTED: November 20, 1961

Fig. 1:



where $B = A^2$, while other parameters are defined by:

$$\omega_o^2(MS_o - rC) = \gamma, \ \frac{3}{4}\omega_o^2 MS_o\beta = \rho, \ \mu = MS_o\omega_o^2 \qquad (3).$$

In the case of small fluctuations the solution for B is in the form:

$$B = B_o + \lambda B_1(t, \delta s) + \lambda^2 B_2(t, \delta s) + \ldots \qquad (8).$$

The individual components B_j of Eq. (8) are evaluated and it is shown that the mean value of B in the steady state is:

$$\bar{B}_\infty = \frac{\gamma}{\rho} \quad 1 + (\gamma - \mu)\frac{\overline{\delta s^2}}{\gamma + \alpha} \qquad (25).$$

This equation can be expressed in terms of the feedback coefficient $p = MS/rC$. It is then found that the fluctuation

S/141/62/005/003/006/011

Influence of the parameter E192/E382

The differential equation of the system is:

$$\dot{v} + \omega_o^2 \int v\,dt = \omega_o^2 v(MS - rC) - \omega_o^2 MS\beta v^3 \qquad (1)$$

Where v is the voltage at the grid, $\omega_o^2 = (LC)^{-1}$ and the characteristic of the tube is $i = Sv(1 - \beta v^2)$. The approximate solution of the equation is in the form:

$$v = A \cos(\omega_o t) \qquad (2)$$

where A is a slowly-changing amplitude. The final equation for the amplitude is shown to be in the form:

$$\frac{dB}{dt} = \gamma B - \rho B^2 + \lambda(\mu B - \rho B^2)\delta s(t) \qquad (7)$$

Card 2/4

40024
S/141/62/005/003/006/011
E192/E382

9,2584

AUTHOR: Malakhov, A.N.

TITLE: Influence of the parameter fluctuations in an oscillator on its behaviour near the bifurcation point

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 5, no. 3, 1962, 516 - 522

TEXT: The behaviour of an oscillator in the vicinity of its self-excitation threshold is investigated; the principal parameter of interest being the slope of the tube which undergoes random fluctuations about its mean value (the author - Radiotekhnika i elektronika, 2, 438, 1957). The oscillator (Fig. 1) is of the tuned-anode type and the slope of its tube undergoes fluctuations $s(t)$ about the mean value S_o :

X

$$S = S(t) = S_o + s(t) = S_o\left[1 + \delta s(t)\right] .$$

Card 1/4

33222

S/141/61/004/006/009/017
Some methods and results of E192/E382

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of Gor'kiy University)

SUBMITTED: February 8, 1961

Card 8/8

in Fig. 5, where W_β is plotted as a function of n. The experiments showed that the relative width of the spectral line of the first oscillator was 10^{-6} when an oxide-cathode tube was employed and 10^{-7} when the oscillator was based on a tungsten cathode; The corresponding figures were 5×10^{-7} and 10^{-7} for the oscillator operating at 1.25 Mc/s. It is concluded, therefore, that a substantial portion of the spectral line width in the oscillator is due to the flicker noise of the tubes; this fluctuation component can be eliminated by employing tubes with tungsten cathodes. The authors thank I.L. Bershteyn for making useful criticism. There are 6 figures, 1 table and 14 references: 12 Soviet-bloc and 2 non-Soviet-bloc. The English-language references mentioned are: Ref. 1: D. Middleton, Quart. Appl. Math., 9, 337; 10, 35, 1952; Ref. 2: D. Middleton - Trans. IRE, ED-1, 56, 1954.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

33222

Some methods and results of S/141/61/004/006/009/017
E192/E382

$$W_{\alpha}^{\text{мин}}(\Omega) = \frac{10^{-7} - 10^{-10}}{\Omega} \tag{4.8}$$

$$W_{\nu}^{\text{мин}}(\Omega) = \frac{1}{K_{\nu}(\Omega, n)} \; \frac{10^{-7} - 10^{-10}}{\Omega} \tag{4.9}$$

By analysing these formulae, it is found that the sensitivity of the two methods is identical if the equivalent quality factor of the tuned circuit is given by:

$$Q_K = Q_{K\text{э}} \cong nQ_{\text{Л}} = \text{ctg}\, \psi_o \omega_c \tau_o \tag{4.12}$$

The tuned-circuit method was employed to investigate the fluctuations in an oscillator operating at 100 kc/s and an oscillator of 1.25 Mc/s. Some of the results are illustrated

Card 6/8

$$\beta(t) = \frac{1}{1+k^2+2k\cos\psi_o}\Big\{\alpha(t) + k^2\alpha(t+\tau_o) + k\left[\alpha(t) + \alpha(t+\tau_o)\right]\cos\psi_o - k\sin\psi_o \Delta\varphi\Big\} \quad (3.1).$$

Again, the expressions for the spectral density of $\beta(t)$ are derived on the basis of Eq. (3.1). The sensitivity of the measurement equipment of either type depends on the internal noise of the equipment. The noise is primarily produced by the detector and by the analyser. The detector noise consists of flicker and shot noise. The minimum detectable amplitude-spectral density and frequency-fluctuation density are determined by the equipment noise and it is shown that these quantities can be expressed by:

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Some methods and results of S/141/61/004/006/009/017
E192/E382

$$W_{\Delta z}(\Omega, n) = \bar{z}^2 \ell^2 W_\beta(\Omega, n) \qquad (1.4)$$

which is applied to the spectrum analyser. The symbol ℓ in Eq. (1.4) is a multiplier, determined by the type of detector. For a linear detector $\ell = 1$ and for a square detector $\ell = 2$. If a tuned circuit is used in the discriminator, the quantity $\beta(t)$ can be expressed by (Ref. 5: G.S. Gorelik, G.A. Yelkin - Radiotekhnika i elektronika, 2, 28, 1957):

$$\beta + 2\delta\beta + \lambda^2\beta = \lambda^2\alpha + \delta\alpha - \eta\nu \qquad (2.1)$$

This equation is employed to determine the amplitude, frequency and frequency-amplitude fluctuations over $\beta(t)$. In the case of a discriminator based on a delay line, the quantities $\beta(t)$, $\alpha(t)$ and $\nu(t)$ are functionally related as follows (Ref. 3 and Ref. 6: V.S. Troitskiy - Radiotekhnika i elektronika, 1, 818, 1956):

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Some methods and results of S/141/61/004/006/009/017
E192/E382

$$W_\beta(\Omega, n) = K_\alpha(\Omega, n) W_\alpha(\Omega) + K_\nu(\Omega, n) W_\nu(\Omega) + K^o_{\alpha\nu}(\Omega, n) W^o_{\alpha\nu}(\Omega) + K^1_{\alpha\nu}(\Omega, n) W^1_{\alpha\nu}(\Omega) \quad (1.3)$$

where $W_x(\Omega)$ is the spectral density of the signal $x(t)$ at the frequency Ω, n is a certain parameter dependent on the setting of the discriminator, $K(\Omega, n)$ are frequency characteristics of the discriminator and $W^o_{\alpha\nu}(\Omega) W^1_{\alpha\gamma}(\Omega)$ are mixed spectral densities. The detector is followed by a filter which only passes a frequency lower than ω_o. The output signal of the filter contains a mean component $\bar{z}$ and fluctuations $\Delta z(t)$, which are proportional to $\beta(t)$. If it is assumed that the detector does not introduce any frequency distortion, the spectral density of the useful signal $\Delta z(t)$ at the output of the filter is:

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where $\alpha(t)$ and $\nu(t)$ are stationary random processes having a cross-correlation function $\Phi_{\alpha\nu}(\tau) = \overline{\alpha(t)\nu(t + \tau)}$, such that $\bar{\alpha} = 0$, $\bar{\nu} = 0$, $\overline{\alpha^2} \ll 1$ and $\overline{\nu^2} \ll \omega_o^2$. One of the methods of measurement is based on a discriminator containing a tuned circuit; the second method employs a delay line in the discriminator. The basic function of the discriminator consists of converting the frequency modulation of the input signal into amplitude-modulation of the output signal. The voltage at the input of the detector is therefore in the form:

$$y(t) = B_o \left[1 + \beta(t)\right] \cos\left(\omega_o t + \int \nu_1(t)dt\right) \qquad (1.2)$$

The relative amplitude fluctuations $\beta(t)$ in the signal $y(t)$ are linearly dependent on $\alpha(t)$ and $\nu(t)$, so that the general expression for the spectral density of the fluctuations $\beta(t)$ can be expressed as:

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E192/E382

9.3260 (1067, 1139, 1159)

AUTHORS: Malakhov, A.N., Nikonov, V.N. and Razina, T.D.

TITLE: Some methods and results of measurements of amplitude- and frequency-fluctuations in oscillators

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 4, no. 6, 1961, 1052 - 1064

TEXT: Two methods of measurement of the spectral density of frequency fluctuations are known (Ref. 2: D. Middleton - Trans. IRE, ED-1, 56, 1954; Ref. 3: I.L. Bershteyn, Izv. AN SSSR, ser.fiz., 14, 145, 1950). The methods are discussed and evaluated and one of them is employed to measure the parameters of an experimental oscillator. In general, the measurement of the fluctuation spectra in an oscillator is based on the system illustrated in Fig. 1, which consists of: 1 - a discriminator; 2 - detector and 3 - analyser. The quasi-chromatic signal applied to the input of the discriminator is in the form:

$$x(t) = A_0 \left[1 + \alpha(t)\right] \cos \left(\omega_0 t + \int \nu(t)dt\right) \qquad (1.1)$$

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Some investigations of the form ... S/141/61/004/005/010/021
E032/E114

There are 7 references: 3 Soviet-bloc and 4 non-Soviet-bloc.
The English language references read as follows:

Ref.2: D. Middleton, Phil. Mag., v.42, 89 (1951).
Ref.4: J.L. Stewart, Proc. IRE, v.42, 1539 (1954).
Ref.5: J.A. Mullen, D. Middleton, Proc. IRE, v.45, 874 (1957).
Ref.6: D. Middleton, Quart. Appl. Math., v.10, 35 (1952).

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete
(Scientific Research Institute of Radiophysics, Gor'kiy University)

SUBMITTED: February 8, 1961

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Some investigations of the form ... S/141/61/004/005/010/021
E032/E114

$$\langle \Omega^m \rangle_z = \int_{-\infty}^{+\infty} \Omega^m W_z(\Omega)\, d\Omega \tag{31}$$

where Ω is the departure of the frequency ω from the mean frequency ω_0. The possibilities of this method are illustrated by applying it to various frequency fluctuations, e.g.

$$S_\nu(\Omega) = \frac{1}{\pi}\,\frac{\lambda}{\lambda^2 + \Omega^2} \tag{44}$$

and

$$S_\nu(\Omega) = \frac{1}{2\lambda}\exp\left(-\frac{|\Omega|}{\lambda}\right) \tag{45}$$

In all cases the form of the spectral line of a real oscillation is never gaussian or resonant.

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$$A^{o}(\tau) = \frac{R_o^2}{2} \overline{\left[1 + \alpha(t) + \alpha(t + \tau) + \alpha(t)\, \alpha(t + \tau)\right] \cos \Delta\varphi}; \qquad (3)$$

$$A^{1}(\tau) = \frac{R_o^2}{2} \overline{\left[1 + \alpha(t) + \alpha(t + \tau) + \alpha(t)\, \alpha(t + \tau)\right] \sin \Delta\varphi}; \qquad (4)$$

$$\Delta\varphi = \int_{t}^{t+\tau} \nu(\xi)\, d\xi \qquad (5)$$

The asymmetry is due to the odd function A^1. Eqs. (3) and (4) are written down in their most general form and therefore in order to obtain some specific conclusions about their form the author discusses a number of special cases. A development is also given of the method of moments as applied to the above problem. In this method the form of the spectral line is analysed by considering the quantity are stationary and that the relation between them is also stationary, it is shown that in general the form of the line is asymmetric and is given by:

$$\underline{W}_z(\Omega) = W_z^o(\Omega) + W_z^1(\Omega); \qquad (6)$$

$$\left.\begin{aligned} W_z^o(\Omega) &= \frac{1}{2\pi} \int_{-\infty}^{+\infty} A^o(\tau) \cos \Omega\tau d\tau, \\ W_z^1(\Omega) &= \frac{1}{2\pi} \int_{-\infty}^{+\infty} A^1(\tau) \sin \Omega\tau d\tau \end{aligned}\right\} \qquad (7)$$

where the correlation function is given by

$$\Phi_z(\tau) = A^o(\tau) \cos \omega_o \tau - A^1(\tau) \sin \omega_o \tau \qquad (2)$$

and

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700030-6

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9,2580 (1140,1159)

S/141/61/004/005/010/021
E032/E114

AUTHOR: Malakhov, A.N.

TITLE: Some investigations of the form of the spectral line of an oscillation

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v.4, no.5, 1961, 912-923.

TEXT: The output of any real oscilator is always subject to amplitude and phase fluctuations and in general there is a definite correlation between them. The present author reports an analysis of the effect of this correlation on the form of the spectral line of an oscillation. The oscillations are assumed to be of the form

$$\left.\begin{aligned} z(t) &= R_0 \left[1 + \alpha(t)\right] \cos\left[\omega_0 t + \varphi(t)\right]; \\ \varphi(t) &= \int \nu(t)\, dt, \quad \overline{\alpha}^2 \ll 1, \quad \overline{\nu}^2 \ll \omega_0^2, \quad \overline{\alpha} = \overline{\nu} = 0. \end{aligned}\right\} \quad (1)$$

where $\alpha(t)$ and $\nu(t)$ are the amplitude and frequency fluctuations. Assuming that the random processes $\alpha(t)$ and $\nu(t)$

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Correlation of the Amplitude ... E192/E382

a) simultaneously, $b_{\parallel} \neq 0$ and $b_{\perp} \neq 0$ is the case when an oscillator is nonisochronous;
b) simultaneously, $a_{\parallel} \neq 0$ and $a_{\perp} \neq 0$, which occurs when the lefthand-side portion of Eq. (2) contains even as well as odd derivatives, and
c) the spectrum of the noise in the vicinity of ω_o is asymmetrical with respect to ω_o. It is clear that in all actual oscillators at least the third condition is fulfilled. It is therefore necessary to take into account the cross-correlation between the frequency and amplitude fluctuations in determining the spectral line $W_x(\omega)$ of the oscillator.

There are 1 figure and 8 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute at Gor'kiy University)

SUBMITTED: February 28, 1960

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while the cross-correlation function for the fluctuations is:

$$\Phi_{as}(\tau) = \frac{1}{\delta A_0^2} \left\{ \frac{p_1}{p} \int_0^{\infty} \frac{A^0(\tau + y) + A^0(\tau - y)}{2} e^{-py} \, dy + \right. \qquad (22)$$

$$\left. + \int_0^{\infty} A^1(\tau + y) e^{-py} \, dy \right\};$$

The above expressions are used to analyse some special cases:

1) $\tilde{W}_E(\Omega) = W_o$;

2) the derivative of $W_E(\omega)$ in the vicinity of $\omega = \omega_o$ is not equal to zero, and

3) the noise is such that its spectrum in the vicinity of ω_o has a width comparable with p or less than p. From the above it is concluded that for the existence of cross correlation between the amplitude and frequency fluctuations of an oscillator it is necessary and sufficient that one of the following conditions be fulfilled:

$$\Phi_{\alpha}(\tau) = \frac{1}{p\delta A_o^2}\int_0^{\infty} \frac{A^o(\tau + y) + A^o(\tau - y)}{2} e^{-py}dy \qquad (17)$$

From this it is easy to find the spectral density of the amplitude fluctuations; this is expressed by:

$$W_{\alpha}(\Omega) = 2\tilde{W}_E^o(\Omega)/\delta A_o^2(p^2 + \Omega^2) \qquad (18)$$

Similarly, it is shown that the correlation function for the frequency fluctuations is given by:

$$\Phi_{\nu}(\tau) = \frac{A^0(\tau)}{\delta A_0^2} + \frac{p_1^2}{\delta A_0^2 p}\int_0^{\infty} \frac{A^0(\tau + y) + A^0(\tau - y)}{2} e^{-py}\,dy + \frac{2p_1}{\delta A_0^2}\int_0^{\infty} \frac{A^1(\tau + y) - A^1(\tau - y)}{2} e^{-py}\,dy. \qquad (20)$$

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Correlation of the Amplitude ... E192/E382

$$A^0(\tau) = \int_{-\infty}^{+\infty} \tilde{W}_E(\Omega)\cos(\Omega\tau)d\Omega = \int_{-\infty}^{+\infty} \tilde{W}_E^0(\Omega)\cos(\Omega\tau)d\Omega;$$

$$A^1(\tau) = \int_{-\infty}^{+\infty} \tilde{W}_E(\Omega)\sin(\Omega\tau)d\Omega = \int_{-\infty}^{+\infty} \tilde{W}_E^1(\Omega)\sin(\Omega\tau)d\Omega. \quad (11)$$

By solving Eq. (4) with respect to $\alpha(t)$ it is found that:

$$\alpha(t) = \int_0^{\infty} f(t - \zeta)e^{-p\zeta}d\zeta \quad (14)$$

where $f(t) = (a_{\parallel}E_{\perp} + a_{\perp}E_{\parallel})/\delta A_0$. The final expression for the amplitude correlation function, derived on the basis of Eq. (14), is in the form:

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where $E_{\parallel}(t)$ and $E_{\perp}(t)$ are slowly changing functions of time. It is shown that these components can be expressed by:

$$\begin{aligned} E_{\parallel}(t) &= E(t)\cos(\omega_0 t) - (1/\omega_0)\dot{E}(t)\sin(\omega_0 t); \\ E_{\perp}(t) &= -E(t)\sin(\omega_0 t) - (1/\omega_0)\dot{E}(t)\cos(\omega_0 t). \end{aligned} \tag{8}$$

The correlation function of the noise is given by:

$$\Phi_E(\tau) = \int_0^\infty W_E(\omega)\cos(\omega\tau)\,d\omega. \tag{9}$$

which can be approximately be expressed by:

$$\Phi_E(\tau) = A^0(\tau)\cos(\omega_0\tau) - A^1(\tau)\sin(\omega_0\tau). \tag{10}$$

where A^0 and A^1 are slowly changing functions which are defined by:

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where $E(t)$ represents the noise. The fluctuations $\nu(t)$ and $\alpha(t)$ are expressed by the following equations (Ref. 2):

$$\dot{\nu} + p\nu = (-a_{\parallel}\dot{E}_{\parallel} + a_{\perp}\dot{E}_{\perp} + b_{\perp}E_{\parallel} + b_{\parallel}E_{\perp})/\delta A_o \qquad (3)$$

$$\dot{\alpha} + p\alpha = (a_{\parallel}E_{\perp} + a_{\perp}E_{\parallel})/\delta A_o \qquad (4)$$

Eq. (3) can also be written in a more convenient form:

$$\nu = p_1\alpha + (a_{\perp}E_{\perp} - a_{\parallel}E_{\parallel})/\delta A_o \qquad (5)$$

where $p_1 = (a_{\parallel}b_{\parallel} + a_{\perp}b_{\perp})/\delta$. The noise can be expressed by

$$E(t) = E_{\parallel}(t)\cos(\omega_o t) - E_{\perp}(t)\sin(\omega_o t) \qquad (6)$$

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averaging. In order to determine the spectral density of the power fluctuation $W_x(\omega)$, it is necessary to determine the correlation function $\Phi_x(\tau)$ which, in turn, is dependent on the correlation functions of the amplitude fluctuations $\Phi_\alpha(\tau)$, frequency fluctuations $\Phi_\nu(\tau)$ and cross correlation $\Phi_{\alpha\nu}(\tau)$. These functions have been determined for some special cases (Ref. 1 - S.M. Rytov - ZhETF, Vol. 29, 304, 315, 1955). On the other hand, in this work an attempt is made to find $\Phi_\alpha(\tau)$, $\Phi_\nu(\tau)$ and $\Phi_{\alpha\nu}(\tau)$ for a large range of oscillators. It is assumed that the oscillator signal is governed by the following differential equation (Ref. 2 - A.N. Malakhov - Izv. vyssh. uch. zav. - Radiofizika, Vol. 3, 241, 1960):

$$\sum_{k=0}^{n} a_k \frac{d^k x}{dt^k} = F\left(x, \ldots, \frac{d^l x}{dt^l}, \ldots\right) + E(t). \qquad (2)$$

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9,3260 25949 S/141/61/004/001/009/022
E192/E382

AUTHORS: Malakhov, A.N. and Nikonov, V.N.

TITLE: Correlation of the Amplitude and Frequency Fluctuations in Oscillators

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1961, Vol. 4, No. 1, pp. 104 - 112

TEXT: It is assumed that the signal produced by the oscillator is expressed by:

$$x(t) = A_0\left[1 + \alpha(t)\right]\cos\left[\omega_0 t + \int^{t} \nu(\xi)d\xi\right] \qquad (1)$$

where $\alpha(t)$ and $\nu(t)$ are relative fluctuations of amplitude and frequency which are in the form of stationary random processes such that

$$|\alpha| \ll 1, \quad |\nu| \ll \omega_0, \quad \bar{\alpha} = \bar{\nu} = 0$$

where the line above the symbols represents statistical

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Transfer of ....

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the preceding article (Ref. 1) is $F_o = \Omega_o/2\pi = 640$ c.p.s. It should be pointed out that the spectral density W_u as given by Eq. (15) can be regarded as the spectral density of an additional noise existing at the output of a mixer which is due to the fluctuations of the signal and heterodyne voltages and the fluctuations of the transfer function itself.
There are 4 references: 3 Soviet and 1 non-Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of Gor'kiy University)

SUBMITTED: March 24, 1960

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Transfer of ....

$$W_u(\Omega) = W_z(\Omega) + \overline{z^2} W_\varkappa(\Omega) \qquad (15)$$

where $\overline{z^2} = K_o^2 A_o^2 B_o^2/8$. Since the spectrum $W_\varkappa$ is much wider that the spectrum W_z , it follows from Eq. (15) that at a sufficiently low frequency $\Omega \ll \Omega_o$, where Ω_o is a certain critical frequency, $W_u \approx W_z$. The critical frequency Ω_o can be determined from:

$$W_z(\Omega_o) = \overline{z^2} W_\varkappa(\Omega_o) \qquad (16) .$$

If it is assumed that the spectrum W_z is of the Gaussian form, it is easy to evaluate the critical frequency Ω_o . It is estimated that this frequency for the case described in

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Transfer of ....

$$W_u(\Omega) = W_z(\Omega) + \int_{-\infty}^{+\infty} W_z(\xi) W_\varkappa(\xi - \Omega)\, d\xi \qquad (14)$$

where:

$$W_u(\Omega) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} D^0(\tau)\cos(\Omega\tau)\,d\tau;$$

$$W_\varkappa(\Omega) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} \Phi_\varkappa(\tau)\cos(\Omega\tau)\,d\tau.$$

From the above it is seen that the spectrum at the output of a mixer consists of the spectrum W_z and a convolution of the spectra W_z and $W_\varkappa$. The fluctuations $\varkappa(t)$ are in the form of a flicker noise (Ref. 1). In this case, it can be assumed that the spectrum $W_\varkappa$ is much wider than W_z. Consequently, the output spectrum is given by:

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It is now assumed that the transfer coefficient fluctuates as follows:

$$K = K_o \left[1 + \varkappa(t) \right]$$

where $\overline{\varkappa^2} \ll 1$. In this case, the output signal is given by:

$$u_1(t) = K_o \left[1 + \varkappa(t) \right] x(t)y(t) = \left[1 + \varkappa(t) \right] z_1(t)$$

and its correlation function is expressed by:

$$\Phi_{u_1}(\tau) = \left[1 + \Phi_{\varkappa}(\tau) \right] \Phi_{z_1}(\tau) .$$

The spectral density of the output signal is now given by:

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$$A^0(\tau) = \frac{A_0^2}{2}\left[1 + \Phi_\alpha(\tau)\right]\exp\left\{-\frac{1}{2}\chi_1(\tau)\right\};$$

$$B^0(\tau) = \frac{B_0^2}{2}\left[1 + \Phi_\beta(\tau)\right]\exp\left\{-\frac{1}{2}\chi_2(\tau)\right\}, \tag{9}$$

where:

$$\chi_1(\tau) = 2\int_0^\tau (\tau - \xi)\,\Phi_{\nu_1}(\xi)d\xi;$$

$$\chi_2(\tau) = 2\int_0^\tau (\tau - \xi)\,\Phi_{\nu_2}(\xi)d\xi. \tag{10}$$

Similarly, $C^0(\tau)$ is given by:

$$C^0(\tau) = \frac{C_0^2}{2}\left[1 + \Phi_\gamma(\tau)\right]\exp\left\{-\frac{1}{2}\chi(\tau)\right\};$$

$$\chi(\tau) = 2\int_0^\tau (\tau - \xi)\,\Phi_\nu(\xi)d\xi, \tag{11}$$

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Transfer for ....

A_o, B_o, ω_1 and ω_2. These functions are expressed by:

$$x(t) = A_0[1 + \alpha(t)]\cos[\omega_1 t + \int^t \nu_1(\xi)d\xi];$$
$$y(t) = B_0[1 + \beta(t)]\cos[\omega_2 t + \int^t \nu_2(\xi)d\xi]. \quad (8)$$

where $\alpha(t)$, $\beta(t)$, $\nu_1(t)$ and $\nu_2(t)$ are amplitude and frequency fluctuations which are in the form of stationary processes; these amplitudes are much smaller than the average values. If the frequency fluctuations are normally distributed and statistically independent of $\alpha(t)$ and $\beta(t)$, the slowly varying even functions can be expressed by:

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Transfer of ....

$$C^0(\tau) = 2^{-1} K_0^2 A^0(\tau) B^0(\tau). \quad (4)$$

It is now necessary to consider the spectral density of $x(t)$, $y(t)$ and $z(t)$. These densities are $W_x(\Omega)$, $W_y(\Omega)$ and $W_z(\Omega)$, where the argument Ω is measured from the frequencies ω_1, ω_2 and ω_0, respectively. The first spectral density can be expressed by:

$$W_x(\Omega) = \frac{1}{2\pi} \int_{-\infty}^{+\infty} A^0(\tau) \cos(\Omega\tau)\, d\tau. \quad (5)$$

while W_z is given by:

$$W_z(\Omega) = \frac{1}{2} K_0^2 \int_{-\infty}^{+\infty} W_x(\xi) W_y(\xi - \Omega)\, d\xi. \quad (6)$$

It is now assumed that $x(t)$ and $Y(t)$ are in the form of statistical uncorrelated oscillations whose amplitudes and frequencies fluctuate about their average values

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Transfer of ....

The spectra of the function x(t) and y(t) are assumed to be symmetrical with respect to the frequencies ω_1 and ω_2 and bandwidths occupied by them are much less than ω_1, ω_2 or $\omega_o = (\omega_2 - \omega_1)$. In this case, the correlation functions of x(t) and y(t) can be expressed as (Ref. 2):

$$\Phi_x(\tau) = A^o(\tau)\cos(\omega_1\tau) ; \quad \Phi_y(\tau) = B^o(\tau)\cos(\omega_2\tau) \qquad (2)$$

where $A^o(\tau)$ and $B^o(\tau)$ are even functions which change slowly in comparison with $\cos(\omega_1\tau)$, $\cos(\omega_2\tau)$ or $\cos(\omega_o\tau)$. The correlation function for the output can be expressed by:

$$\Phi_z(\tau) = C^o(\tau)\cos(\omega_o\tau) \qquad (3)$$

where:

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9, 3270 (also 1040)

AUTHOR: Malakhov, A.N.

TITLE: Transfer of a Quasi-monochromatic Signal Through an Unstable Mixer

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1960, Vol. 3, No. 6, pp. 1004-1009

TEXT: An ideal mixer having a constant transfer function K_o is first considered. By assuming that the difference frequencies are only of interest at the output of the mixer, the device can be described by the following equation:

$$z_1(t) = K_o x(t) y(t) \tag{1}$$

where $z_1(t)$ is the output voltage,
$x(t)$ is a random input signal and
$y(t)$ is a random voltage of the local oscillator (heterodyne).

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Fluctuations of ....

ranging from 1 c.p.s. to 100 kc/s is given by

$$\overline{\delta K_f^2} = (10^{-7} \div 10^{-10}) f^{-1} \qquad (10) .$$

There are 1 figure and 3 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete (Scientific Research Radiophysics Institute of Gor'kiy University)

SUBMITTED: March 22, 1960

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$$\overline{\delta K_f^2} = A^2 \overline{\delta V_{o_f}^2} + D^2 \overline{\delta x_f^2} \qquad (6).$$

For a normal crystal operating at $i_o = 1$ mA, the first component of the spectral density can be expressed by:

$$\overline{\delta V_{o_f}^2} = (10^{-7} \quad 10^{-10}) f^{-1} \qquad (8).$$

On the other hand, for a klystron-type local oscillator it can be assumed that the second component is given (Refs. 2, 3) by:

$$\overline{\delta x_f^2} = (10^{-9} \quad 10^{-10}) f^{-1} \qquad (9).$$

By determining A and D it is found that the total spectral density of the transfer-function fluctuation for frequencies

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Fluctuations of ....

Since, in most practical cases, $i_o \ll B$, Eqs. (1) and (2) can be written as:

$$K = \frac{\alpha i_o R}{1 + \alpha i_o R}\mu(x), \quad i_o = BI_o(x)e^{-\alpha r i_o} \qquad (3) .$$

Now, the relative fluctuation of the transfer function can be expressed by:

$$\delta K = A\delta V_o + D\delta x \qquad (4)$$

where $\delta V_o = \delta i_o$ and A and D are coefficients depending on the parameters of the circuit and the diode. On the basis of Eq. (4) it can be shown that the spectral density of the transfer-function fluctuation can be expressed by:

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Fluctuations of ....

frequencies ω_c and ω_Γ. The characteristic of the crystal diode is represented by:

$$i = B(e^{\alpha v} - 1)$$

where α and B are the characteristic parameters of the diode. It is known (Ref. 1) that the modulus of the transfer function of the mixer is:

$$K = V_n/V_c = \frac{\alpha(i_o + B)R}{1 + \alpha(i_o + B)R}\,\mu(x) \qquad (1)$$

where $\mu(x) = I_1(x)/I_o(x)$, where $I_o(x)$ and $I_1(x)$ are modified Bessel functions and $x = \alpha V_\Gamma$. On the other hand, i_o is given by:

$$i_o = B\left[I_o(x)e^{-\alpha r i_o} - 1\right] \qquad (2).$$

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